

## **Amendments to the Claims**

This listing of claims will replace all prior versions, and listings, of claims in the application:

### **Listing of Claims:**

1. (Currently Amended) A method for configuring multiple resources in a system, including a host adaptor, a switch and a storage device, the method comprising:
  - providing a plurality of elements capable of configuring resources in the system, wherein each element specifies configuration parameters to use to configure instances of the resource, and wherein each resource is capable of being configured by multiple elements, each of which provides a different configuration of the resource;
  - maintaining service information for each element indicating at least one service attribute that results from the configuration of a resource by that element;
  - receiving at least one administrator specified service attribute for a configuration, the administrator specified service attribute including a first availability option, a second availability option, and a third availability option, wherein the first availability option does not define any data and hardware redundancy, wherein the second availability option defines data redundancy for a configured storage device, and wherein the third availability option defines data redundancy of a configured storage device and redundancy of at least one other switch or host adaptor component;
  - comparing the administrator specified service attribute to the service information to determine at least one element and resource configured thereby for which the service information indicates a service attribute that matches the at least one administrator specified service attribute;
  - and
  - using the determined elements to configure resource instances indicated in the service information to implement the specified service attributes.

- 1 2. (Original) The method of claim 1, further comprising:  
2 receiving information indicating a specified host from the administrator for  
3 which the resources will be configured, and wherein the configured resource  
4 instances are used by the specified host.
- 1 3. (Original) The method of claim 1, wherein at least one resource to configure  
2 comprises a storage resource, wherein storage elements are capable of  
3 providing different configurations of the storage resources, further comprising:  
4 determining total available storage space at the determined storage  
5 resource instances;  
6 presenting information on the total available storage space; and  
7 receiving administrator input in response to the presented information  
8 indicating selected storage space less than the available storage space to  
9 allocate.
- 1 4. (Original) The method of claim 3, further comprising:  
2 determining storage resource instances capable of being configured by  
3 the determined storage element to allocate the administrator selected storage  
4 space.
- 1 5. (Original) The method of claim 1, wherein at least one resource comprises a  
2 switch, wherein the service information for switch elements that configure the  
3 switch resource indicates a data throughput of the switch, wherein the  
4 administrator specified service attribute indicates a specified data throughput,  
5 wherein the determined switch element has service information that satisfies the  
6 specified data throughput, and wherein the determined switch element configures  
7 at least one switch instance to provide the specified data throughput.

1 6. (Original) The method of claim 1, wherein at least one resource comprises a host  
2 adaptor in a host, wherein the resources are being configured for use by the  
3 host, wherein the service information for switch elements that configure the  
4 switch resource indicates one of multiple availability levels, wherein the  
5 administrator specified service attribute indicates a specified availability level,  
6 wherein the determined host adaptor element has service information that  
7 satisfies the specified availability level, and wherein the determined host adaptor  
8 element configures at least one host adaptor instance in the host to provide the  
9 administrator specified availability level.

1 7. (Original) The method of claim 6, wherein the administrator specified availability  
2 level defines redundant paths from the host to storage resources, and wherein  
3 the determined host adaptor element configures multiple host adaptors in the  
4 host to enable multiple paths to communicate with the storage resource.

1 8. (Original) The method of claim 1, wherein at least one resource comprises a  
2 switch, wherein the service attributes in the service information for switch  
3 elements that configure the switch resource indicates an availability level  
4 indicating whether redundant switch components are provided with the  
5 configuration, wherein the administrator specified service attribute indicates one  
6 specified availability level, wherein the determined switch element has service  
7 information that satisfies the specified availability level, and wherein the  
8 determined switch element configures switch components to provide the  
9 specified availability level.

1 9. (Original) The method of claim 1, wherein at least one of the determined  
2 resources comprises a storage resource, wherein the service information  
3 associated with storage elements that configure the storage resource includes at  
4 least one service attribute indicating an availability attribute, wherein the  
5 administrator specified service attributes for the storage resource indicates one

specified availability level, and wherein the selected storage element that configures the storage resource has service information that satisfies the administrator specified availability level.

10. (Original) The method of claim 1, wherein the resources to configure are members of the set of configurable resources comprising a host adaptor, switch, storage resource, virtualization appliance, volume manager, and snapshot program.

11. (Canceled).

12. (Original) The method of claim 1, wherein the administrator specified at least one service attribute indicates availability and performance for the host adaptor, switch, and storage devices to configure for a host, and wherein the determined elements for configuring the host adaptor, switch, and storage devices have service information that satisfies the administrator specified availability and performance attributes for the host adaptor, switch, and storage device.

13. (Original) The method of claim 1, wherein the administrator specified service attribute indicates to provide a redundant instance of at least one resource, and wherein at least one determined element has service information indicating a redundant instance of the at least one resource indicated as redundant by the administrator specified availability.

14. (Original) The method of claim 1, further comprising:  
registering, with each element, a proxy object including interfaces used to access the element with a lookup service, wherein the proxy object includes the service information, and wherein the elements are used to configure the selected resources by using the interfaces for the elements maintained in the element proxy objects.

15. (Currently Amended) A method for configuring storage resources in a system including a host adaptor, a switch and a storage device, the method comprising:
- providing a plurality of storage elements capable of configuring the storage resources in the system, wherein each storage element specifies configuration parameters to use to configure the storage resource, and wherein each storage resource is capable of being configured by multiple storage elements, each of which provides a different configuration of the storage resource;
  - maintaining service information for each storage element indicating at least one storage attribute resulting from the configuration of a resource by the element;
  - receiving at least one administrator specified service attribute for the configuration of the storage resource, the administrator specified service attribute including a first availability option, a second availability option, and a third availability option, wherein the first availability option does not define any data and hardware redundancy, wherein the second availability option defines data redundancy for a configured storage device, and wherein the third availability option defines data redundancy of a configured storage device and redundancy of at least one other switch or host adaptor component;
  - comparing the administrator specified service attribute to the service information to determine one storage element and storage resource configured thereby for which the service information indicates a service attribute that matches the administrator specified service attribute;
  - and
  - using the determined storage element to configure the storage resources indicated in the service information to implement the specified service attributes.
16. (Canceled).

1 17. (Original) The method of claim 15, wherein the at least one service attribute in  
2 the service information indicates at least one performance and availability  
3 attribute resulting from the configuration of the resource by the element.

1 18. (Original) The method of claim 15, wherein the configurable storage resources  
2 comprise virtualization appliances.

1 19. (Currently Amended) A system for configuring multiple resources, comprising:  
2 a plurality of configurable resources, including a host adaptor, a switch  
3 and a storage device;

4 means for providing a plurality of elements capable of configuring the  
5 resources in the system, wherein each element specifies configuration  
6 parameters to use to configure instances of the resource, and wherein each  
7 resource is capable of being configured by multiple elements each of which  
8 provides a different configuration of the resource;

9 means for maintaining service information for each element indicating at  
10 least one service attribute that results from the configuration of the a resource by  
11 that element;

12 means for receiving at least one administrator specified service attribute  
13 for a configuration, the administrator specified service attribute including a first  
14 availability option, a second availability option, and a third availability option,  
15 wherein the first availability option does not define any data and hardware  
16 redundancy, wherein the second availability option defines data redundancy for a  
17 configured storage device, and wherein the third availability option defines data  
18 redundancy of a configured storage device and redundancy of at least one other  
19 switch or host adaptor component;

20 means for comparing the administrator specified service attribute to the  
21 service information to determine at least one element and resource configured  
22 thereby for which the service information indicates a service attribute that  
23 matches the at least one administrator specified service attribute;

24                   and  
25                   means for using the determined elements to configure resource instances  
26                   indicated in the service information to implement the specified service attributes.

1    20.   (Original) The system of claim 19, further comprising:  
2                   means for receiving information indicating a specified host from the  
3                   administrator for which the resources will be configured, and wherein the  
4                   configured resource instances are used by the specified host.

1    21.   (Original) The system of claim 19, wherein at least one resource to configure  
2                   comprises a storage resource, wherein storage elements are capable of  
3                   providing different configurations of the storage resources, further comprising:  
4                   means for determining total available storage space at the determined  
5                   storage resource instances;  
6                   means for presenting information on the total available storage space; and  
7                   means for receiving administrator input in response to the presented  
8                   information indicating selected storage space less than the available storage  
9                   space to allocate.

1    22.   (Original) The system of claim 21, further comprising:  
2                   means for determining storage resource instances capable of being  
3                   configured by the determined storage element to allocate the administrator  
4                   selected storage space.

1    23.   (Original) The system of claim 19, wherein at least one resource comprises a  
2                   switch, wherein the service information for switch elements that configure the  
3                   switch resource indicates a data throughput of the switch, wherein the  
4                   administrator specified service attribute indicates a specified data throughput,  
5                   wherein the determined switch element has service information that satisfies the

specified data throughput, and wherein the determined switch element configures at least one switch instance to provide the specified data throughput.

24. (Original) The system of claim 19, wherein at least one resource comprises a host adaptor in a host, wherein the resources are being configured for use by the host, wherein the service information for switch elements that configure the switch resource indicates one of multiple availability levels, wherein the administrator specified service attribute indicates a specified availability level, wherein the determined host adaptor element has service information that satisfies the specified availability level, and wherein the determined host adaptor element configures at least one host adaptor instance in the host to provide the administrator specified availability level.

25. (Original) The system of claim 24, wherein the administrator specified availability level defines redundant paths from the host to storage resources, and wherein the determined host adaptor element configures multiple host adaptors in the host to enable multiple paths to communicate with the storage resource.

26. (Original) The system of claim 19, wherein at least one resource comprises a switch, wherein the service attributes in the service information for switch elements that configure the switch resource indicates an availability level indicating whether redundant switch components are provided with the configuration, wherein the administrator specified service attribute indicates one specified availability level, wherein the determined switch element has service information that satisfies the specified availability level, and wherein the determined switch element configures switch components to provide the specified availability level.

27. (Original) The system of claim 19, wherein at least one of the determined resources comprises a storage resource, wherein the service information



3 associated with storage elements that configure the storage resource includes at  
4 least one service attribute indicating an availability attribute, wherein the  
5 administrator specified service attributes for the storage resource indicates one  
6 specified availability level, and wherein the selected storage element that  
7 configures the storage resource has service information that satisfies the  
8 administrator specified availability level.

1 28. (Original) The system of claim 19, wherein the resources to configure are  
2 members of the set of configurable resources comprising a host adaptor, switch,  
3 storage resource, virtualization appliance, volume manager, and snapshot  
4 program.

29. (Canceled).

1 30. (Original) The system of claim 19, wherein the administrator specified at least  
2 one service attribute indicates availability and performance for the host adaptor,  
3 switch, and storage devices to configure for a host, and wherein the determined  
4 elements for configuring the host adaptor, switch, and storage devices have  
5 service information that satisfies the administrator specified availability and  
6 performance attributes for the host adaptor, switch, and storage device.

1 31. (Original) The system of claim 19, wherein the administrator specified service  
2 attribute indicates to provide a redundant instance of at least one resource, and  
3 wherein at least one determined element has service information indicating a  
4 redundant instance of the at least one resource indicated as redundant by the  
5 administrator specified availability.

1 32. (Original) The system of claim 19, further comprising:  
2 a lookup server including lookup service;

means for registering, for each element, a proxy object including interfaces used to access the element with the lookup service, wherein the proxy object includes the service information, and wherein the elements are used to configure the selected resources by using the interfaces for the elements maintained in the element proxy objects.

33. (Currently Amended) A system for configuring storage resources in a system, comprising:

storage resources, including a host adaptor, a switch and a storage device;

means for providing a plurality of storage elements capable of configuring the storage resources in the system, wherein each storage element specifies configuration parameters to use to configure the storage resource, and wherein each storage resource is capable of being configured by multiple storage elements, each of which provides a different configuration of the storage resource;

means for maintaining service information for each element indicating at least one storage attribute resulting from the configuration of a storage resource by that element;

means for receiving at least one administrator specified service attribute for the configuration of the storage resource, the administrator specified service attribute including a first availability option, a second availability option, and a third availability option, wherein the first availability option does not define any data and hardware redundancy, wherein the second availability option defines data redundancy for a configured storage device, and wherein the third availability option defines data redundancy of a configured storage device and redundancy of at least one other switch or host adaptor component;

means for comparing the administrator specified service attribute to the service information to determine one storage element and storage resource configured thereby for which the service information indicates at least one service attribute that matches the administrator specified service attribute;

25                   and  
26                   means for using the determined storage element to configure the storage  
27 resources indicated in the service information to implement the specified service  
28 attributes.

34.   (Canceled).

1   35.   (Original) The system of claim 33, wherein the at least one service attribute in the  
2 service information indicates at least one performance and availability attribute  
3 resulting from the configuration of the resource by the element.

1   36.   (Original) The method of claim 33, wherein the configurable storage resources  
2 include virtualization appliances.

1   37.   (Currently Amended) An article of manufacture including code for configuring  
2 multiple resources in a system, including a host adaptor, a switch and a storage  
3 device, wherein the code causes operations comprising:

4           providing a plurality of elements capable of configuring resources in the  
5 system, wherein each element specifies configuration parameters to use to  
6 configure instances of the resource, and wherein each resource is capable of  
7 being configured by multiple elements , each of which provides a different  
8 configuration of the resource;

9           maintaining service information for each element indicating at least one  
10 service attribute that results from the configuration of a resource by that element;

11          receiving at least one administrator specified service attribute for a  
12 configuration, the administrator specified service attribute including a first  
13 availability option, a second availability option, and a third availability option,  
14 wherein the first availability option does not define any data and hardware  
15 redundancy, wherein the second availability option defines data redundancy for a  
16 configured storage device, and wherein the third availability option defines data

redundancy of a configured storage device and redundancy of at least one other switch or host adaptor component;

comparing the administrator specified service attribute to the service information to determine at least one element and resource configured thereby for which the service information indicates a service attribute that the at matches least one administrator specified service attribute;

and

using the determined elements to configure resource instances indicated in the service information to implement the specified service attributes.

38. (Original) The article of manufacture of claim 37, wherein the code further causes operations comprising:

receiving information indicating a specified host from the administrator for which the resources will be configured, and wherein the configured resource instances are used by the specified host.

39. (Original) The article of manufacture of claim 37, wherein at least one resource to configure comprises a storage resource, wherein storage elements are capable of providing different configurations of the storage resources, wherein the code further causes operations comprising:

determining total available storage space at the determined storage resource instances;

presenting information on the total available storage space; and

receiving administrator input in response to the presented information indicating selected storage space less than the available storage space to allocate.

40. (Original) The article of manufacture of claim 39, wherein the code further causes operations comprising:

3                   determining storage resource instances capable of being configured by  
4                   the determined storage element to allocate the administrator selected storage  
5                   space.

1   41.   (Original) The article of manufacture of claim 37, wherein at least one resource  
2           comprises a switch, wherein the service information for switch elements that  
3           configure the switch resource indicates a data throughput of the switch, wherein  
4           the administrator specified service attribute indicates a specified data throughput,  
5           wherein the determined switch element has service information that satisfies the  
6           specified data throughput, and wherein the determined switch element configures  
7           at least one switch instance to provide the specified data throughput.

1   42.   (Original) The article of manufacture of claim 37, wherein at least one resource  
2           comprises a host adaptor in a host, wherein the resources are being configured  
3           for use by the host, wherein the service information for switch elements that  
4           configure the switch resource indicates one of multiple availability levels, wherein  
5           the administrator specified service attribute indicates a specified availability level,  
6           wherein the determined host adaptor element has service information that  
7           satisfies the specified availability level, and wherein the determined host adaptor  
8           element configures at least one host adaptor instance in the host to provide the  
9           administrator specified availability level.

1   43.   (Original) The article of manufacture of claim 42, wherein the administrator  
2           specified availability level defines redundant paths from the host to storage  
3           resources, and wherein the determined host adaptor element configures multiple  
4           host adaptors in the host to enable multiple paths to communicate with the  
5           storage resource.

1   44.   (Original) The article of manufacture of claim 37, wherein at least one resource  
2           comprises a switch, wherein the service attributes in the service information for

switch elements that configure the switch resource indicates an availability level indicating whether redundant switch components are provided with the configuration, wherein the administrator specified service attribute indicates one specified availability level, wherein the determined switch element has service information that satisfies the specified availability level, and wherein the determined switch element configures switch components to provide the specified availability level.

45. (Original) The article of manufacture of claim 37, wherein at least one of the determined resources comprises a storage resource, wherein the service information associated with storage elements that configure the storage resource includes at least one service attribute indicating an availability attribute, wherein the administrator specified service attributes for the storage resource indicates one specified availability level, and wherein the selected storage element that configures the storage resource has service information that satisfies the administrator specified availability level.

46. (Original) The article of manufacture of claim 37, wherein the resources to configure are members of the set of configurable resources comprising a host adaptor, switch, storage resource, virtualization appliance, volume manager, and snapshot program.

47. (Canceled).

48. (Original) The article of manufacture of claim 37, wherein the administrator specified at least one service attribute indicates availability and performance for the host adaptor, switch, and storage devices to configure for a host, and wherein the determined elements for configuring the host adaptor, switch, and storage devices have service information that satisfies the administrator specified

availability and performance attributes for the host adaptor, switch, and storage device.

49. (Original) The article of manufacture of claim 37, wherein the administrator specified service attribute indicates to provide a redundant instance of at least one resource, and wherein at least one determined element has service information indicating a redundant instance of the at least one resource indicated as redundant by the administrator specified availability.

50. (Original) The article of manufacture of claim 37, wherein the code further causes operations comprising:

registering, with each element, a proxy object including interfaces used to access the element with a lookup service, wherein the proxy object includes the service information, and wherein the elements are used to configure the selected resources by using the interfaces for the elements maintained in the element proxy objects.

51. (Currently Amended) An article of manufacture for configuring storage resources in a system, including a host adaptor, a switch and a storage device, wherein the code causes operations comprising:

providing a plurality of storage elements capable of configuring the storage resources in the system, wherein each storage element specifies configuration parameters to use to configure the storage resource, and wherein each storage resource is capable of being configured by multiple storage elements, each of which provides a different configuration of the storage resource;

maintaining service information for each storage element indicating at least one storage attribute resulting from the configuration of a storage resource by that element;

receiving at least one administrator specified service attribute for the configuration of the storage resource, the administrator specified service attribute

15 including a first availability option, a second availability option, and a third  
16 availability option, wherein the first availability option does not define any data  
17 and hardware redundancy, wherein the second availability option defines data  
18 redundancy for a configured storage device, and wherein the third availability  
19 option defines data redundancy of a configured storage device and redundancy  
20 of at least one other switch or host adaptor component;

21 comparing the administrator specified service attribute to the service  
22 information to determine one storage element and storage resource configured  
23 thereby for which the service information indicates at least one service attribute  
24 that matches the administrator specified service attribute;

25 and

26 using the determined storage element to configure storage resources  
27 indicated in the service information to implement the specified service attributes.

52. (Canceled).

1 53. (Original) The article of manufacture of claim 51, wherein the at least one service  
2 attribute in the service information indicates at least one performance and  
3 availability attribute resulting from the configuration of the resource by the  
4 element.

1 54. (Original) The article of manufacture of claim 51, wherein the configurable  
2 storage resources comprise virtualization appliances.